CHAPTER 4. NORTHERN PACIFIC OCEANIC OPERATIONS

1. THE NOPAC SYSTEM.

a. General. Due to increases in passenger demand, time zone differences, airport noise restrictions, and other factors, most Northern Pacific (NOPAC) air traffic is concentrated in predictable flow patterns. The effect of these flows is that eastbound traffic peaks between 0800 coordinated universal time (UTC) and 2000 UTC, and westbound traffic peaks between 2200 UTC and 0800 UTC. During peak periods, airspace becomes congested due to the limitations of the lateral and longitudinal separation required. This is compounded by winds aloft and route distances. The long route distances add to the critical aspects of the airspace because climb approval and altitude availability may necessitate in-flight decisions concerning destination. The most critical altitudes are flight levels (FL) 310 to 410.

b. Composite Route System. To more adequately meet present and future demands, the NOPAC Composite Route System was implemented in March 1982 to maximize use of available airspace while providing a safe and orderly traffic flow. The composite route system is comprised of five air traffic service (ATS) routes that travel the NOPAC between Alaska and Japan. The two northern routes are used for westbound traffic except for R580, which is used for eastbound traffic transiting the Tokyo/Anchorage flight information region (FIR) between 1000 UTC and 1700 UTC. The three southern routes are used for eastbound traffic, except that A590 is used for westbound aircraft crossing the Tokyo/Anchorage FIR between 2300 UTC and 0500 UTC when R220 and R580 traffic is saturated. The system allows a combination of 50 nautical miles (NM) lateral separation and 1,000 feet vertical separation on immediately adjacent routes. By management of route and altitude assignments, any aircraft at the same altitude and not longitudinally separated are laterally separated by at least 100 NM. Any aircraft on the same route are separated by 2,000 feet vertically or 20 minutes longitudinally. The longitudinal separation can be reduced to 10 minutes or less when mach techniques are applied. Standard oceanic (noncomposite) separation is used elsewhere unless radar services are provided or aircraft are within domestic control areas where domestic nonradar control procedures are used. A sample of a composite route, with latitude/longitude coordinates of reporting points and magnetic bearings and distances between them, follows:

Route R220

- BETHEL VORTAC - 239° 312 NM 057° -
- NABIE (N59°18.0′ W171°45.4′) - 237° 3296 NM 056° -
- NUKKS (N57°15.1′ E179°44.3′) - 237° 3297 NM 054° -
- NEEVA (N54°40.7′ E172°11.8′) - 241° 3281 NM 060° -
- NINNO (N52°21.5′ E165°22.8′) - 240° 3280 NM 058° -
- NIPPO (FIR boundary) (N49°41.9′ E159°19.3′) - 238° 3330 NM 053° -
- NYTIM (N46°11.9′ E153°00.5′) - 233° 3330 NM 051° -
- NOKKA (N42°23.3′ E147°28.8′) - 231° 3163 NM 049° -
- NOHO (N40°25.0′ E145°00.0′) - 231° 3122 NM 049° -
- NANAC (N38°54.2′ E143°13.9′)

(VHF) frequency 128.95 megahertz (MHz) is for exclusive use as an air-to-air communications channel. In emergencies, however, initial contact for such relays may be established on 121.5 MHz (the frequency guarded by all aircraft operating in the oceanic airspace) and transferred as necessary to 128.95 MHz. In normal HF propagation conditions, appropriate overdue action procedures are taken by ATC in the absence of position reports or relays. In all cases of communications failure, the pilot should follow the oceanic clearance last received and not revert to the original flight plan.

5. MACH NUMBER TECHNIQUE. Mach number technique for the South Pacific is identical to that used in NOPAC (see paragraph 5 in Chapter 4).

6. IN-FLIGHT CONTINGENCIES.

a. General. The procedures for in-flight contingencies are often aircraft specific, and therefore cannot be covered in detail here for every aircraft. However, the procedures listed provide for such cases as inability to maintain assigned FL due to weather, aircraft performance, and pressurization failure. These procedures are primarily applicable when rapid descent, turning back, or both are necessary. The pilot's judgment determines the sequence of actions taken while considering the specific circumstances.

b. Basic Procedures. If an aircraft experiences navigational difficulties, it is essential that the pilot inform ATC as soon as the condition is apparent so that appropriate action can be taken to prevent conflicts with other aircraft. If any aircraft is unable to continue flight in accordance with its ATC clearance, a revised clearance shall, whenever possible, be obtained prior to initiating any action, using the radio telephone distress or urgent signals, as appropriate. If prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time; in the meantime, the aircraft shall broadcast its position (including the ATS route designator) and intentions on 121.5 MHz at suitable intervals until ATC clearance is received. In such circumstances, communications with certain VHF stations may be practical. Frequencies should be verified before using. A list of these stations follows:

Adak approach - 134.1 MHz
Shemya tower - 126.2 MHz
Anchorage Center - 128.5 MHz (Cold Bay)
Anchorage Center - 127.4 MHz (Dutch Harbor)
Anchorage Center - 127.8 MHz (St. Paul Island)
Anchorage Center - 128.2 MHz (Shemya)

If unable to comply with these provisions, the aircraft should leave its assigned route by turning 90 degrees to the right or left whenever possible. The direction of the turn should be determined by the position of the aircraft within the route system. The turn should be made in a direction that will keep the aircraft within the system and prevent any possible chance of a conflict with other traffic. For instance, aircraft on NOPAC routes should always turn south due to the proximity of these routes to the Russian FIR's. Aircraft on the northern route of the CEPAC route structure should turn south; aircraft on the southern route of the CEPAC route structure should turn north. An aircraft able to maintain its assigned level should, nevertheless, climb or descend 500 feet while acquiring and maintaining, in either direction, a track laterally separated by 25 nautical miles from its assigned route or track.

OTR-11 serves as a departure route from RJAA (Narita) and RJTT (Tokyo) into the eastbound NOPAC routes, and for eastbound traffic overflying Japan. OTR-11 routing is:

CVC (Choshi) - KAGIS - A590
CVC (Choshi) - KAGIS - 085° 91NM 266° - ABETS - A591
CVC (Choshi) - KAGIS - SCR (Score) - COMFE - G344

(2) Within the Anchorage/Oakland control area (CTA)/FIR's, OTR-14 serves traffic departing North America and transiting the Gulf of Alaska for the NOPAC route system. OTR-14 routing is:

N54°20′ W0140°00′ - 277° 402NM 090° - MARLO (N57°27.9′ W150°31.7′) - J123 - AKN (King Salmon) - EHM (Cape Newenham) - 250° 281NM 069° - OYSTA (N58°12.9′ W170°57.4′) - 251° 305NM 069° - NUKKS (N57°15.1′ E179°44.3′) - R220

OTR-15 serves traffic departing North America and transiting the Gulf of Alaska for the NOPAC composite route system. OTR-15 routing is:

N52°30′ W140°00′ - 274° 388NM 087° - N55°05′ W150°00′ - 273° 312NM 089° - PDN (Port Heiden NDB) - 258° 379NM 074° - SPY (St. Paul Island NDB/DME) - 250° 308NM 069° - ORDON (N56°12.8′ W179°23.3′) - R580

OTR-16 serves traffic departing the United States and transiting the North Pole for the NOPAC route system. OTR-16 routing is:

N48°00′ W150°00′ - 273° 416NM 088° - N50°15′ W160°00′ - 265° 385NM 081° - N51°10′ W170°00′ - 270° 250NM 089° - NUD (Adak) - J115 - SYA (Shemya) - 255° 296NM - 073° - OMPPA (N51°26.3′ E166°20.2′) - R580

2. GENERAL PROCEDURES.

*a. **Climb Times.*** All aircraft entering the Anchorage FIR and planning a higher altitude en route should forward the time that the climb to higher altitude is desired. This information should be included with the first mandatory position report. Although most carriers include climb times in their flight plans, actual loads, weather conditions, outside air temperature, and other factors are almost always different from the forecast situation. Pilots should notify air traffic control (ATC) if the climb time differs significantly. Climb times are used by controllers to determine action that may be necessary to preclude merging air traffic conditions. Advance planning usually means better airspace use, more altitude change approvals, and better service to more users. Without accurate climb times, an altitude change for one aircraft may cause other flights to be trapped at low FL's. Traffic permitting, cruise climbs to higher en route altitudes will be approved when requested.

*b. **Visual Flight Rules (VFR) Climbs.*** Requests for VFR climbs can only be approved when the aircraft is within the confines of Control 1234/Anchorage Continental FIR or Woody Island Control Area (formerly known as Control 1235).

*c. **Peak Traffic Constraints.*** Eastbound peak traffic periods are 1000 UTC to 1800 UTC. West-bound peak traffic period is 0000 UTC to 0700 UTC. Due to traffic volume, flights desiring to operate opposite the peak traffic flow can expect to be rerouted or restricted to a low altitude. If feasible, users planning to operate in the NOPAC composite area at airspeeds below mach 0.78 should use other than the peak hours for their flights. This avoids congestion and expedites traffic.

3. FLIGHT PLANS AND PREFERRED ROUTES.

*a. **Flight Plans.*** Flightcrews operating in the composite route system are expected to carry a flight plan for each of the composite routes for the direction to be flown, plus a plan for Route A590 since that route is used for eastbound or westbound traffic at different times. This prevents unnecessary delays, since pilots may be assigned routes other than those filed in the flight plan. Flight plans should be filed according

to International Civil Aviation Organization (ICAO) procedures and format. This permits automatic flight data processing at oceanic control centers and oceanic radio stations en route. Flights originating outside of Anchorage or Tokyo regions that enter oceanic airspace without intermediate stops should submit flight plans as early as possible. In addition to the normal requirements of addressing the flight plan to all oceanic control centers en route, associated oceanic radio stations should be addressed. This provides those stations with information such as flight identification, selective calling (selcal), aircraft registration, destination, and estimated time of arrival (ETA). This information is necessary to control traffic. A properly addressed flight plan that is formatted according to ICAO standards is automatically handled by oceanic centers. When planning a flight via composite routes, list the point of entry followed by the route designator and the point of exit.

b. Preferred Routes. Prior to 1300 UTC daily, users may inform Anchorage Air Route Traffic Control Center (ARTCC) by teletype of their proposed routes. Preferred ATS routes are announced daily for aircraft entering the Anchorage FIR en route to the composite route system between 2200 UTC and 0500 UTC daily. Between 1300 UTC and 1330 UTC, Anchorage ARTCC issues an international Notice to Airmen (NOTAM) that specifies the transition route that must be filed for flights planned for R220, R580, and A590.

NOTAM example: "West coast operators...the following routes are in use today between 2200 UTC and 0500 UTC for westbound aircraft entering the Anchorage FIR and transitioning to the NOPAC: for R220, B327 over MARLO; for R580, G469 over NESSY; for A590, A342 over BLOWS."

Aircraft entering the composite route system between 0400 UTC and 2000 UTC daily must file via R220. Aircraft departing Anchorage for the NOPAC route system between 2200 UTC and 0300 UTC may anticipate a restriction of 10 minutes between successive departures. Due to a route crossing in a nonradar environment, westbound arrivals destined for RJCC, RJCH, RJSM and other westbound aircraft leaving the NOPAC system by way of V51 must file via R220. R580 is an eastbound track for aircraft entering the Anchorage FIR between 1000 UTC and 1700 UTC daily. The preferred route to Alaska, Europe, midwestern United States, and U.S. east coast airports is by way of R580 - OZZIE - flight planned route.

To Alaska, Canada, U.S. west coast, midwest United States, and U.S. east coast airports:

- A590 - SPY - G469 - NESSY - flight planned route
- A590 - EMH - B327 - MARLO - flight planned route
- A590 - EHM - J996R - ANC - flight planned route

To Canada, U.S. west coast, and southwestern United States airports:

- R591 - ARGOS - G215 - DUVAL - flight planned route
- R591 - ASHER - A342 - BLOWS - flight planned route

To U.S. west coast and southwestern airports: G344-CHIPT-R451-SAVRY-flight planned route.

4. COMMUNICATIONS AND POSITION REPORTING.

a. High Frequency (HF) Communications. Most NOPAC area communications are conducted on HF single sideband. Pilots communicate with control centers through oceanic radio stations. Aircraft reports, messages and requests are relayed by the station to the appropriate ATC center by interphone, computer, or teletype. The relay function, coupled with the need for intercenter coordination, may cause delays in handling routine requests. Priority message handling procedures for urgent communications reduce time lag; however, flightcrews should consider the possibility of delays when requesting step climbs, reroutes, or other routine requests requiring action by ATC. Delays can be reduced by advance planning. Aircraft entering a FIR should establish communication with the appropriate oceanic radio station. The station will advise the aircraft of the primary and secondary HF channels in use. If possible, the aircraft should monitor both channels. If only one frequency can be monitored, the primary should be guarded and the secondary should be the first frequency checked if communication is lost on the primary. If the selcal unit is working when initial contact is made, the aircraft may maintain a selcal watch on the appropriate frequencies. If the selcal

unit is inoperative or the radio station's selcal transmitter is malfunctioning, the aircraft shall maintain a listening watch on the appropriate NOPAC frequency. The NOPAC HF net operates on the following assigned frequencies: 2932 kilohertz (KHz), 5628 KHz, 6655 KHz, 8951 KHz, 10048 KHz, 11330 KHz, 13273 KHz, and 17904 KHz.

b. Guard Station. The oceanic radio station guarding for flight operations is normally the station associated with the ATC center responsible for the FIR. At the FIR boundary, the responsibility for the guard normally changes to the station associated with the new FIR. The flight must ensure that it establishes communication with each successive guard facility. Each oceanic radio station normally listens continuously on all assigned frequencies. If en route HF communications fail, every effort should be made by the flightcrew to relay progress reports through other aircraft. The VHF frequency 128.95 megahertz (MHz) is for exclusive use as an air-to-air communication channel. In emergencies, however, initial contact for such relays may be established on 121.5 MHz. In normal HF propagation conditions, appropriate overdue action procedures are taken by ATC in the absence of position reports or relays. In all cases of communication failure, the pilot should follow the oceanic clearance last received and acknowledged.

c. Air-to-Ground Very High Frequency (VHF) Communication. Oceanic radio stations normally have VHF capability within 200 NM of their geographic location. The frequency is listed in the appropriate publications. This frequency may be used prior to departure from the adjacent international airport to establish communication with the radio station, or for aircraft operating within range to relay progress reports or other messages to their company's operations. All international flights departing from Anchorage or Fairbanks, Alaska, should relay their departure time to the FAA Flight Service Station (FSS) on VHF for use in transmitting departure messages.

d. Air-to-Air VHF Communication. Frequency 128.95 MHz has been designated for use in air-to-air communications between aircraft operating in the Pacific area out of range of VHF ground stations to exchange operational information and facilitate resolution of operational problems.

e. Time and Position Reports. When operating on a fixed route with designated reporting points, aircraft should report over such points. Unless otherwise required by ATC, position reports for flights on routes not defined by designated reporting points should be made at the significant points listed in the flight plan. By requiring aircraft to report at intermediate points, ATC is guided by the requirement for positional information at ICAO established intervals and by the need to accommodate varying types of aircraft, traffic load, and weather conditions. When reporting to oceanic radio stations, the prefix "position" should be used on initial contact or prior to the text of the message. Keep in mind that the operator is typing the report into a teletype or computer terminal; it is imperative that the person transmitting the report speak slowly and distinctly so that the message can be correctly copied on the first attempt. To minimize radio frequency congestion, routine weather information and fuel remaining information should not be included in position reports made directly to Anchorage ARTCC. Position reports must include information on the present position, estimated next position, and ensuing position(s) in the sequence indicated below:

(1) Present position
  (a) The word "position"
  (b) Aircraft identification
  (c) Reporting point name or, if not named:
    (i) for east-west flights, latitude in degrees and minutes, and longitude in degrees only (in Tokyo FIR, degrees and minutes)
    (ii) for north-south flights, latitude in degrees only (in Tokyo FIR, degrees and minutes) and longitude in degrees only (in Tokyo FIR, degrees and minutes)
  (d) time over reporting point in four digits UTC
  (e) altitude - FL at which the aircraft is currently operating, plus the assigned altitude if the aircraft is climbing or descending to an assigned altitude

(2) Estimated next position information shall include

(a) name of the next required position information point or, if not named, as in (1)(c) above; and

(b) estimated time over next position. If the estimated time is in error by more than 5 minutes (3 minutes in Tokyo FIR), a revised estimate shall be forwarded to Tokyo or Anchorage FIR, as appropriate, as soon as possible.

(3) Ensuing position information shall include the name of the next successive reporting point, whether compulsory or not. If the point is not named, use the procedure in (1)(c) above.

f. Special Reporting Procedures. All aircraft operating on ATS routes R220, R580, R591, and G344 must cross-check their position over reporting points abeam Shemya VORTAC (109.0 MHz, DME-27, identification SYA). In addition to normal reporting procedures, pilots shall provide the cross-check in terms of the DME distance when crossing the specified radial. The radial/DME distances are as follows:

- for NEEVA on R220, SYA 328R/135 DME
- for ONADE on R580, SYA 328R/068 DME
- for AMMOE on R591, SYA 148R/050 DME
- for CHIPT on G344, SYA 148R/100 DME

A July 1985 memorandum of understanding between the United States, USSR (currently Russia), and Japan provides for direct voice communication between Anchorage ARTCC, Tokyo ACC, and Khabarovsk ACC to allow coordination between these facilities in assisting civil aircraft in certain emergency situations. These situations are mechanical problems requiring immediate landing, unlawful seizure of an aircraft, loss of communication, unidentified aircraft in USSR (Russia) FIR, and possible entry of aircraft into USSR (Russia) FIR. This communication link is checked daily at 0000 UTC.

g. Transponder Codes. When operating west of 164E, transponders should be set to Mode A Code 2000. When east of 164E, a discrete code may be assigned. This code should be maintained unless otherwise advised by ATC. If no discrete code is assigned, transponders should be set to Code 2000.

5. MACH NUMBER TECHNIQUE.

a. Background. The term "mach number technique" is used to describe the technique of clearing turbojet aircraft operating along the same route to maintain specified mach numbers in order to maintain adequate longitudinal separation between successive aircraft at, climbing to, or descending to the same altitude. The principal objective of the use of this technique is to improve use of the airspace on long routes where ATC has no means other than position reports to ensure the longitudinal separation of aircraft is not reduced below the established minimum. Experience has demonstrated that two or more turbojet aircraft on the same route and FL are more likely to maintain a constant time interval when this technique is used. This is because the aircraft are normally subject to the same wind and air temperature, and minor variations in speed tend to be neutralized over long periods of flight.

b. Application Procedures. Information on the planned mach number must be included in the flight plan for turbojet aircraft operating in oceanic airspace. For all flight plans, the true mach number must be included in Item 15 of the ICAO flight plan. The true airspeed (TAS) in knots equivalent to the planned mach number shall be specified in the remarks section of Item 18 on the same form, along with the abbreviation "TAS" and the four-figure group. When the mach number technique is applied, the normal requirement for ATC to calculate estimated times for the aircraft to pass significant points still applies. This is necessary to ensure longitudinal separation and coordination between ATC units. Intervention by ATC should not be necessary unless position reports indicate that longitudinal separation may be deteriorating to unacceptable levels. In applying this technique, it is imperative that pilots adhere strictly to their assigned cruise mach number at all times, including during climbs and descents, unless a specific reclearance is obtained from

ATC. If an immediate temporary change in the mach number is essential before a revised clearance can be obtained, ATC must be notified as soon as possible that a change has been made.

6. IN-FLIGHT CONTINGENCIES.

a. General. Not all contingencies can be covered in this Advisory Circular (AC), but the following procedures provide for cases such as inability to maintain FL due to weather, aircraft performance, and pressurization failure. They are useful when rapid descent, turn back, or both are required. The pilot's judgment determines the sequence of actions taken.

b. Basic Procedures. If an aircraft experiences navigational difficulties, it is essential that the pilot inform ATC as soon as possible so that the appropriate action can be taken to prevent conflict with other aircraft. If an aircraft is unable to continue flight according to ATC clearance, a revised clearance shall be obtained whenever possible before any action is taken. If prior clearance cannot be obtained, ATC clearance shall be obtained at the earliest possible time. In the interim, the aircraft shall broadcast its position and intentions, including the ATS route designator, on 121.5 MHz at suitable intervals until ATC clearance is received. In such circumstances, communication may also be accomplished on VHF with certain stations, such as ADAK approach on 134.1 MHz; Shemya Tower on 126.2 MHz; Anchorage Center on 118.5 MHz (Cold Bay); on 124.4 MHz at Dutch Harbor; on 127.8 MHz at St. Paul Island; and on 128.2 MHz at Shemya.

If unable to comply with these procedures, the aircraft should leave its assigned route by turning 90 degrees to the right or left whenever possible. The direction of the turn should be determined by the position of the aircraft relative to the route system. Aircraft operating on ATS Route R220 under these circumstances should, if possible, avoid turning northward to leave the route because of the route's proximity to the boundary between Anchorage/Tokyo and the USSR (Russia) FIR. An aircraft that is able to maintain its assigned level should climb or descend 500 feet while acquiring and maintaining, in either direction, a track laterally separated from its assigned route by 20 NM. For subsequent level flight, a level should be selected that differs by 500 feet from those normally used.